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The Royal Botanic Gardens consist of several properties which once belonged to the Royal Family and the greater part of the acreage is made up of two estates, Richmond or Ormonde Lodge and Kew House (also known as the White House), both now demolished.

George II and Queen Caroline lived on the Richmond Lodge estate, which ran from Richmond Green to near the present Brentford Ferry Gate and include much of the Old Deer Park. The neighbouring Kew House estate was later acquired by their son, Frederick, Prince of Wales, who died in 1751. In 1759, his widow, Augusta, Dowager Princess of Wales, created a small botanic garden of nine acres on the land south of the Orangery.

George III succeeded his grandfather in 1760, and it was during his reign that the botanic garden became famous, largely owing to the efforts of the unofficial Director, Sir Joseph Banks, and the Head Gardener, William Aiton. Architecturally, the whole estate was famous for the work of Sir William Chambers, which included the Orangery, Pagoda, a number of elegant temples and the Ruined Arch. It was during George III's reign that the Richmond

and Kew estates were joined.

In 1841, the small botanic garden was acquired by the nation on the recommendation of a Royal Commission. The first Director was Sir William J. Hooker, who increased the size of the Gardens to over 250 acres, and established both the Herbarium and Library and the Museums of Economic Botany. Queen's Cottage and its grounds were given to the Gardens in 1898 on the occasion of Queen Victoria's Diamond Jubilee, and the land around Kew Palace a few years later. Cambridge Cottage was presented to Kew by King Edward VII on the death of the last Duke of Cambridge in 1904.

Contrary to public belief, the primary purpose of the Gardens is not to act as a public park, but as a scientific institution. The main function of the various departments of the Gardens is the accurate identification of plants and plant material, and all collections, both living and dead, have been gathered to that end. At the same time, the Gardens serve as a centre for the distribution of plant material, both decorative and economic. In addition, gardeners trained at Kew have worked all over the world for about the last two hundred years. At present about twenty Student Gardeners are selected annually for a three-year course leading to a Diploma.

The Royal Botanic Gardens come under the Ministry of Agriculture, Fisheries and Food. In addition to the Director's Office where the general administration is conducted, the Gardens are divided as follows:-

I. THE LIVING COLLECTIONS. Recently Wakehurst Place in Sussex has been leased by Kew as a satellite garden at a peppercorn rent from the National Trust. It is not yet opened to the public.

II. MUSEUMS OF ECONOMIC BOTANY (1848)

III. HERBARIUM AND LIBRARY (1852)

IV. JODRELL LABORATORY (1876)

I. THE LIVING COLLECTIONS.

The Royal Botanic Gardens are about 300 acres in area. The soil at Kew is very poor and hungry, consisting largely of sand and gravel, and the average rainfall is only about 23.7 inches a year. The Gardens can be divided into two parts which correspond roughly to the original Richmond and Kew estates, the former being largely woodland and arboretum, and the latter more formal in design.

In the woodland area the main genera of trees and shrubs hardy in this climate are arranged in groups of their species and

varieties around the edge of the Gardens, with the conifers mostly at the southern end, next to the Old Deer Park. Also within this area are the Azalea and Bamboo Gardens and the Rhododendron Dell.

The Lake, which lies in the same part of the Gardens, was formed from existing marshy ground and gravel pits during the mid 19th Century. Queen's Cottage and its bluebell woods are in the south west corner of the Gardens. The Cottage, which is open to the public on summer weekends, was built about 1772 for George III.

All the glasshouses and most of the areas of especial botanical and horticultural interest lie within the boundaries of the old Kew estate, as do various garden ornaments such as the Pagoda, which is an important memorial to the Chinese influence on European gardening in the 18th Century.

The glasshouses are roughly arranged in groups, starting with the Aroid House (No. 1) and the Orangery near the Main Gates. The Orangery is an architectually delightful building designed by Sir William Chambers and erected in 1761. The Filmy Fern House is on the north side of the Orangery.

The next group of glasshouses include the Tropical and Temperate Ferneries (Nos. 2 & 3), the Conservatory (No. 4), and the

Succulent House (No. 5). The T-Range lies just to the south, and here there are houses for cacti and other succulents (No. 7A), South African Heaths (No. 7), Begonias (No. 8), Stove Plants (No. 9), Nepenthes (No. 9A), Tropical and Temperate economic plants (Nos. 11, 12), Pelargoniums (No. 11A), insectivorous plants (No. 10A) and Orchids (Nos. 13A, 13D, 14A, 14D). Victoria amazonica is grown as an annual in House No. 10.

The Palm House is further south, by the Pond. It was designed by Decimus Burton and Richard Turner, and built between 1844-48. The wide range of tropical plants grown here include Palms, Bamboos, Cycads and Bananas. Alongside is the Tropical Waterlily House (No. 15).

The Temperate House is about halfway between the Palm House and the Pagoda. Also designed by Burton it was started in 1860 but not completed until 1899. As the name implies, plants from the warm temperate regions of the world are grown here. The collections include Rhododendrons and Camellias, Palms, Tree Ferns and tender conifers. The Australian House close by was built in 1952, in order that Australian plants might have as good growing conditions as is possible here, where the light and humidity etc. are so different from those to which they are adapted.

The plantings in the more formal part of the Gardens, the old Kew estate, include Iris, Rock and Aquatic Gardens, and associated with the Rock Garden is the Alpine House, which is open during the spring and summer. A 17th Century garden, with parterres, sunken garden and pleached alleys is being created behind Kew Palace, but is not yet open to the public. Kew Palace itself is administered by the Ministry of Public Buildings and Works. In the Herbaceous Ground the plants are arranged in their families, with dicotyledons in the centre, and monocotyledons along the wall. Grasses and sedges are now grown by the T-Range, their old positions having been taken for the rebuilding of the Jodrell Laboratory. There is a woodland garden near the Cumberland Gate, a formal Rose Garden behind the Palm House, and a Heath Garden by the Lion Gate. The main shrub and some tree collections lie between the Palm House and the path on the south side of the Gardens.

Plant-Quarantine at Kew.

From an early date in the history of Kew, the supply of useful plants to countries of the British Commonwealth has been one of the functions of the Gardens. The sending of Cinchona in 1861 to supply India's need of quinine, and of Hevea in 1877 to found the rubber industry of Malaya, are outstanding incidents in work which,

continued over many years, has been effective in aiding development in many countries."

As countries of the Commonwealth have achieved independence, and have become competent to seek their own requirements of planting-material, the part which Kew has had to play in providing their needs has declined in extent and has become modified in purpose. In recent years it has become increasingly realised that, when plants are taken to another country, there is a risk of their carrying plant-diseases and pests into a new area, and this risk is especially great with plants which are propagated vegetatively rather than from seed. It is here that Kew can give help by providing a halfway house in which planting-material passing from one country to another may be held for a period of quarantine, so as to give any virus or other pathogen or pest an opportunity to indicate its presence.

Two heated glasshouses are in use for this work, and these have been chiefly used in recent years for planting-material of different cultivated varieties of banana, cocoa and sugar-cane. Much of the cocoa has come from a collection in Trinidad, and it has been passed on to such territories as Ghana, Nigeria, Cameroun, Ceylon, India, Malaya, Fiji and the Solomon Islands.

Since the plants are grown in some measure of isolation, the quarantine houses are not open to visitors.

II. MUSEUMS OF ECONOMIC BOTANY

There are two museums at Kew open to the public, apart from Kew Palace, the one being a general botanical museum and the other a wood museum. There is also a reference museum, not open to the public and housed in a very old building which, over a century ago (1847-48), was opened by the then Director, Sir William Hooker, as a museum of economic botany - the first of its kind. The Marianne North Gallery, which contains over 800 oil paintings of flowers, executed by Miss North in many parts of the world during the last century, is situated between the Ruined Arch and the Victoria Gate.

1. General Museum

The collections in the General Museum are in the process of being re-arranged and modernized. Most of the exhibits at present on view relate to economic plants and plant products. The cases facing the entrance hall are intended to give the visitor an idea of the history and functions of Kew. It will be observed that the cases devoted to cereals, sugar cane, sugar beet, the potato and resins, all important plant industries, are among those that have been re-arranged. Among the special exhibits on the ground floor

is one devoted to models of flowers, those of orchids grown at Kew being notable.

During the spring and summer months the wild plant table in this Museum attracts much attention. Thanks to the co-operation of several botanists and collectors it has been possible to show plants from many parts of the British Isles throughout the season - as many as 700-800 different species.

2. Wood Museum

The Wood Museum is situated at the north end of the Gardens, adjoining Kew Green, and is part of the building often referred to as Cambridge Cottage. The Museum was opened in 1910 as a Museum of British Forestry. In 1957 its function was changed to that of a Wood or Timber Museum, with special emphasis on Commonwealth timbers, especially those that are imported or used in the wood working industries of the United Kingdom. The greater part of the ground floor is devoted to plank specimens while the upstairs rooms are in the main devoted to specimens illustrating some of the many uses of wood.

III. HERBARIUM AND LIBRARY.

The Herbarium and Library are housed in the large block of buildings to the right of the Main Entrance to the Gardens. These

comprise:- 1) parts of an old residence known as Hunter House now used for the Library and general office purposes, and 2) three large wings, A, B and C, erected in 1932, 1902 and 1877 respectively for the storage of preserved plant material. In order to provide additional accommodation for the herbarium collections, adequate space for the Library and workrooms for the staff, a new wing is being erected and should be completed in 1968.

1. Herbarium

The Herbarium was founded in 1852, and the extensive herbaria of George Bentham and William Hooker, forming the basis of the present collections, were added in 1854 and 1866 respectively. During the past hundred years a great range of botanical material has been incorporated until the collections now comprise an excellent representation of the world's plant-life. The herbarium specimens consist of the following:-

1) Pressed and dried plants mounted on standard-sized sheets of paper or card; these are classified in families and genera, the phanerogams mostly following Bentham and Hooker's "Genera Plantarum"; the genera are usually sorted under major geographical regions, so that it is possible to find a particular specimen in a short time. There are over four

million mounted sheets of specimens which are filed in stiff folders in wooden or steel cabinets on the ground floors and galleries of the three wings.

2) Nearly 27,000 glass jars of flowers and fruits in liquid preservative, mainly of species in which the structure of flowers is difficult to interpret after drying, such as members of the Orchidaceae.

3) Fruits and seeds in cardboard boxes or tins which are stored in the drawers of table and other cabinets.

This vast collection has been and is still being used in the preparation of floras, plant-lists, monographs, revisions and for other taxonomic work, as well as for the naming of large numbers of specimens received from many overseas countries, especially from those of the British Commonwealth. Floras prepared wholly or partly at Kew include those of the West Indies, Fiji Islands, New Zealand, Australia, Malay Peninsula, Hong Kong, India, Burma, Pakistan, Ceylon, Mauritius, South Africa and Tropical Africa. At present botanists on the staff are engaged in writing accounts of the plants for the second edition of the "Flora of West Tropical Africa" as well as for the "Flora of Tropical East Africa", "Flora Zambesiaca", "Flora of Cyprus" and "Flora of Iraq".

There are several other important publications largely prepared at Kew. Papers recording the researches of the Kew staff generally are published in the "Kew Bulletin" which, with its various supplements, now comprises 93 volumes. The "Botanical Magazine", with fine coloured plates, is the oldest extant botanical periodical (1787), and has been edited and mainly prepared at Kew since 1841; its illustrations of individual plants now total more than 10,000 plates, filling 175 volumes. The 36 volumes of the "Icones Plantarum", prepared at Kew since 1841, contain 3600 black-and-white illustrations and descriptions of new or rare plants in the Kew Herbarium.

New generic and specific names given to flowering plants are extracted at Kew from botanical literature and, together with their place and year of publication and the country of origin of new species, are recorded in the "Index Kewensis", now consisting of 15 large quarto volumes, which are indispensable to botanists and everyone interested in the scientific names of plants. The original two volumes and the 13 supplements to this work contain about 850,000 generic and specific names. Supplementing the "Index Kewensis", is the "Index Londinensis", of eight quarto volumes, listing the published illustrations of flowering plants and ferns from 1753

onwards; the compilation of a new supplement for 1936-1960 is now being undertaken at Kew.

2. The Library

The foundation of the Library dates from 1852, when Dr. Bromfield's Library was presented. This small collection of books was considerably enlarged by the presentation of George Bentham's library in 1854. In 1866, Sir William J. Hooker's exceedingly valuable collection of books and manuscripts was purchased, and the nucleus of the present Library was thus established. It has always been the aim to make this Library as comprehensive as possible, so that it now ranks as one of the most complete collections in the world on botany and especially taxonomy.

The main Library is situated in the Herbarium with departmental libraries in the Jodrell Laboratory, the Museums and Descanso House (for the Gardens' staff).

The collection now comprises some 100,000 volumes and 130,000 reprints; it includes many rare and valuable items, and is particularly rich in pre-Linnean literature, as well as monographs and floras of the world. About 1500 current periodicals and serials are taken, many by exchange with other botanical institutions in other countries.

The Library archives consist of more than 250,000 letters, together with note-books and other manuscripts dating from the middle of the eighteenth century onwards. Other important collections are briefly as follows: (a) Illustrations Collection of more than 160,000 flower paintings, engravings and photographs; (b) Map Collection of about 8,000 sheets; (c) over 1500 portraits of botanists; (d) a small collection of books, manuscripts, prints and photographs relating to the history of Kew Gardens during the two centuries of its existence.

IV. JODRELL LABORATORY

The present Jodrell Laboratory was officially opened on 7th May, 1965 by the late Lord Florey, who was then President of the Royal Society, in the presence of the Minister of Agriculture and other distinguished guests. It stands on the site of the old Jodrell Laboratory, a modest building presented to Kew in 1876 by Mr. T.J. Phillips Jodrell, who was a personal friend of Sir Joseph Hooker. The old laboratory became known in botanical circles throughout the world as a centre for research into the structure and physiology of plants.

The new Jodrell Laboratory which is a two-storey building of contemporary architectural design, provides, on the first floor,

research facilities for plant anatomy and morphology, cytology and physiology. The ground floor, besides an enquiries office, a small library and a common room, also has two teaching laboratories where instruction is given to the student gardeners. The entrance hall of the laboratory also leads to an air-conditioned lecture theatre, with comfortable seating for audiences of up to 200. This is available not only for the Kew staff and students, but also for meetings of appropriate national societies with botanical or horticultural interests. There are at present a total of 21 members of staff and several visiting research botanists working in the building.

Current anatomical research by members of the staff and visitors is concerned with the systematic anatomy of Monocotyledons, on which a reference book in a number of volumes is being prepared, two of which have already appeared and two others are in the hands of the publishers. Further volumes are also being prepared. A continuous stream of enquiries relating to plant anatomy is received from many parts of the world, and there are frequent calls from visiting research workers to discuss anatomical problems. Hundreds of everyday practical problems of plant identification that can be solved only by anatomical methods

are dealt with every year as matters of daily routine.

Cytological investigations range from surveys of chromosome number and karyotype morphology in a wide range of exotic plants to detailed studies of chromosome structure and behaviour in individuals and natural populations. Amongst families receiving attention at the present time are the Liliaceae, Commelinaceae, Araceae and Orchidaceae, and at the generic level close examination is being made of Senecio, Pelargonium, Spartina, Cyanotis, Callisia, Impatiens, etc.

Investigations in the Physiology Section are concerned with the ways in which plant growth and development are modified by variations in environment; the main effects studied being temperature, daylength, and light intensity and quality. Studies with seeds are concerned with examining germination patterns of individual species from a number of selected families, and seeking to establish broad generalisations on germination requirements related to climatic conditions and family affiliations. Work on the nutrition of young, epiphytic, tropical orchids is concerned with the relative effectiveness of different forms of nitrogen and the effects of light intensity on germination and growth. Experiments with growth promoting and inhibiting chemicals on

development and flowering of various tropical plants attempt to establish interactions between the effects of chemicals and the plant's responses to temperature and photo-period.

The balance between naturally occurring stimulators (hormones) and inhibitors is being studied during successive stages of plant development, and also between plants of different habit or growth rate. A major part of this work depends on the use of bio-assays to assess levels of these compounds in plant extracts.

Notes